REMARKS

The acknowledgment of the claim of priority under 35 U.S.C. §119 and receipt of priority documents is noted with appreciation

The specification has been amended to insert subject headers where appropriate. No new matter has been introduced by the amendments to the specification.

Claims 1-20 remain pending in the application. Claim 21 has been added. Support for claim 21 can be found in paragraph [0052]. The application now includes claims 1-21.

Claims 1-20 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite. As recommended by the Examiner, independent claims 1 and 19 have been amended to re-phrase the "melting" step such that the language is more specific. All claims have been amended to comply with the requirements of 35 U.S.C. §112, as well as to comport with U.S. patent practice. Support can be found throughout the specification, and no new matter has been introduced by these amendment. Thus, it is respectfully submitted that the rejection under 35 U.S.C. §112, second paragraph, is now moot in view of these amendments, and withdrawal of this ground of rejection is requested.

Claims 1-4, 7, 10, 15, 19 and 20 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Publication 2003/0029724 to Derand or U.S. Patent 6,126,765 to Ohman in view of U.S. Publication 2004/0265504 to Magnin and U.S. Patent 4,710,253 to Soszek. Claims 5 and 8 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Derand or Ohman in view of Magnin, Soszek and further in view of U.S. Patent 3,419,409 to Dettling. Claim 6 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Derand or Ohman in view of Magnin, Soszek and further in view of U.S. Patent 3,922,418 to Lauchenauer. Claim 9 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Derand or Ohman in view of Magnin, Soszek and further in view of U.S. Patent 3,662,395 to Doi. Claims 11-13 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Derand or Ohman in view of Magnin, Soszek and further in view of U.S. Patent 2,947,625 to Bertelsen. Claims 14 and 16 have been rejected under 35 U.S.C. §103(a)

as being unpatentable over Derand or Ohman in view of Magnin, Soszek and further in view of U.S. Patent 6,099,679 to Karem. Finally, claims 17 and 18 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Derand or Ohman in view of Magnin, Soszek and further in view of U.S. Patent 6,515,048 to Kalbe. These grounds of rejection are respectfully traversed in view of the amendments above and remarks below.

The present invention is directed towards an improved method of gluing microcomponents to a substrate. A pulverulent hotmelt adhesive, either reactive or nonreactive, is applied to a bonding site. Pulverulent hotmelt adhesives are not new; however, their use in allowing quick, presice and stable placement of microcomponents on substrates is new. When the adhesive has been heated by a focusable heat source (see Figures 4 and 9), such as a laser, or be conventional heating methods, a microcomponent can be applied immediately to the melted adhesive. As explained in paragraph [0010], bonding takes place immediately during cooling. Using a pulverulent hotmelt adhesive (required in all claims), as opposed to a viscous or liquid adhesive, has several advantages over the prior art. First, bonding takes place immediately during cooling without displacing the microcomponent, even tiny distances in the μm range (see paragraph [0010]). Second, hotmelt adhesives need only be applied to one side of the bond area with subsequent placement of the bond areas together is sufficient for a suitable adhesive bond (see paragraph [0014]). Third, the time for curing the adhesive bond is significantly reduced which also prevents displacement (see paragraph [0014]). Lastly, the adhesive bond can be reversed in the event of erroneous placement of microcomponents (see Paragraph [0015]). None of the references cited by the Examiner, either alone or in combination, teach or suggest the claimed invention. Most notably, none of the references show a method for adhering microcomponents to substrates at precise locations.

The drawing figures shows a variety of mechanisms for applying a pulverent hotmelt adhesive to the surface of a substrate or microcomponent. For example, Figure 1 shows placement of balls; Figure 2 shows electrostatic attraction at precise location; Figures 3-5 show distribution of powder over the surface of a substrate, heating only a portion of the applied powder, and removal of the non-heated powder; Figure 6 shows using a patterned

roller similar to a printing operation; Figure 7 shows immersing raised portions into a granules of glue; Figure 8 shows printing through a screen; Figure 9 shows using a laser similar to Figure 4 or using a die to stamp glue from a tape to selected location; Figure 10 shows a transfer sheet; Figure 11 shows placement of particles at precise locations on a transfer sheet which is then applied to a substrate; and Figure 12 shows placement of a microcomponent into a granules of glue. The invention is focused on placement of pulverent adhesive at precise locations for quickly and precisely joining a microcomponent to a substrate.

Derand discloses a method for covering a set of open microchannel structures which are fabricated on a planar surface. Derand addresses the problem of providing a method of producing a leak-proof covering of a set of microchannel structures (see Paragraph [0013]). This is done by providing a lid-forming material having an even layer of *thermoglue* (i.e., a viscous adhesive) on one side and applying the lid-forming material to the surface carrying the microchannel structures (see claim 1 in Derand). In other words, there is a substrate with very small channel-like structures that are covered by a lid. No gluing of microcomponents to a substrate is disclosed in Derand. In fact, the thermoglue disclosed in Derand is of the type which causes problems addressed by the present invention (i.e., reduced quality of the bond, longer bonding/curing time, etc.).

Ohman, like Derand, discloses a method of forming a microchannel and/or microcavity structure. Similarly, the structure of microchannels are covered in order to provide closed channels. This is done by bonding together two elements having opposed plane surfaces of the same or different materials, one or both surfaces having open channels and/or cavities. The two surfaces are fixed together by a material capable of fusing with and having a lower melting point than that of the materials of the two element surfaces (see column 1, lines 27 to 35). There is no mention in Ohman of gluing microcomponents to a substrate. Again, like Derand, the material used to fuse the two plane-surface elements together consists of thermoplastic material *dissolved in a solvent form* (i.e., viscous) which causes the types of problems that are specifically addressed by the claimed invention.

Magnin discloses a method for electrostatically attaching a polymer powder adhesive

to a non-metallic substrate, especially for depositing powdered adhesive onto paper or plastic (see Paragraph [0001]). The Examiner recognizes that Magnin addresses contacting two substrates together or to itself. However, there is no suggestion that Magnin could be useful for gluing microcomponents to a substrate. Instead, since Magnin focuses on pre-applied adhesives on paper or plastic substrates for consumers (see Paragraph [0002]), and does not show use of a pulverant adhesive at selected contact areas being used to join a microcomponent to a substrate.

Soszek is directed to the manufacture of a circuit board by applying a film of heat actuatable adhesive to a substrate and depositing a layer of conductive powder on the film. The powder and film are then activated by laser radiation, for example. The excess conductive powder and adhesive film are then removed (see Abstract). It should be noted, however, that Soszek does not disclose a *pulverulent*, or powder, adhesive. The powder used in Soszek is a conductive powder which is deposited on the film of adhesive. It is clear that the adhesive disclosed by Soszek cannot be a powdered adhesive; otherwise, there would be a risk that the conductive powder and the adhesive would mix and the desired conductive tracks could not be manufactured. Thus, Soszek fails to disclose gluing microcomponents to a substrate, let alone by using a powder adhesive.

The remaining references cited by the Examiner do nothing to mitigate the deficiencies, admitted or otherwise, of Derand, Ohman, Magnin and/or Soszek. Dettling, cited for teaching the application of a powder coating to a substrate surface, discloses a process for forming a uniform coating the surfaces of articles using pulverulent granules. However, the Dettling process does not address using such granules for adhesive purposes. Lauchenauer, cited for applying powder through a screen, discloses a heat-sealable textile sheet material suitable for use as an interlining for garments and, thus, does not address the use of powders for adhering microcomponents to substrates. Doi, cited for applying powder to a substrate by way of an electrostatically charged drum, teaches the use of a drum on which an information signal is recorded and transferring the information signal into an image and applying that image in powdered-ink form to a recording sheet. In other words, Doi discloses a process for

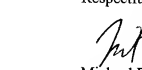
transferring powdered ink to paper. However, Doi does not address using the powder for adhesive purposes, let along connecting a microcomponent to a substrate and, thus, is well outside the scope of art one would consider in developing the present invention. Bertelsen, cited for developing a powder material onto transfer sheet and using a roller to transfer the powder to a substrate, discloses a method for manufacturing printed circuits. However, the powder in Bertelsen is used to form the printed circuits and not for adhering the circuits to a board, let alone a microcomponent to a substrate (see column 2, line 37 - column 3, line 75). Karem discloses a method for gluing a pair of surfaces to one another by preparing a glue from a polymer in the form of a powder. However, the method disclosed in Karem involves industrial productions, not microcomponents, and is thus outside the scope of the present invention.

For the foregoing reasons, it is clear that none of the cited references, either alone or in combination, teach or suggest the features of the claimed invention. Thus, it is respectfully requested that the application be reconsidered, that claims 1 - 20 be allowed, and that the application be passed to issue.

Since all rejections, objections and requirements contained in the outstanding official action have been fully answered and shown to be in error and/or inapplicable to the present claims, it is respectfully submitted that reconsideration is now in order under the provisions of 37 C.F.R. §1.111(b) and such reconsideration is respectfully requested. Upon reconsideration, it is also respectfully submitted that this application is in condition for allowance and such action is therefore respectfully requested.

A provisional petition is hereby made for any extension of time necessary for the continued pendency during the life of this application. Please charge any fees for such provisional petition and any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041 (Whitham, Curtis, Christofferson & Cook).

Respectfully submitted,



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